Claims

1. A method for preparing a filter element comprising:
blending an activated carbon, a metal oxide, and a binder to form a filter media mixture;
shaping the filter media mixture into a filter body; and
calcining the filter body to form a filter element.

2. The method of claim 1, further comprising mixing a solvent with the binder to form a slurry prior to blending the activated carbon and metal oxide.

3. The method of claim 2, further comprising dry blending the activated carbon and metal oxide.

4. The method of claim 2, wherein the binder is magnesium aluminosilicate.

5. The method of claim 2, wherein the binder is silica sol.

6. The method of claim 2, wherein the binder is alumina sol.

7. The method of claim 3, wherein shaping the filter media mixture comprises extruding the filter media mixture to form a first extrudate.

8. The method of claim 7, further comprising extruding the first extrudate to form a second extrudate.

9. The method of claim 8, further comprising extruding the second extrudate to form a third extrudate.

10. The method of claim 2, wherein the solvent is water.

11. The method of claim 8, wherein the filter body is calcined at about 300° C.

12. The method of claim 11, wherein the activated carbon is a granulated activated carbon.

13. The method of claim 11, wherein the activated carbon is a powdered activated carbon.

14. The method of claim 11, wherein the activated carbon is a reactivated activated carbon.

15. The method of claim 13, wherein the metal oxide is magnesium oxide.

16. The method of claim 13, wherein the metal oxide is calcium oxide.

17. The method of claim 17, wherein the metal oxide is barium oxide.

18. The method of claim 3, further comprising calcining the metal oxide prior to blending with the activated carbon and the binder.

19. The method of claim 18, wherein the metal oxide is high density metal oxide.

20. The method of claim 3, wherein the metal oxide is a powder.

21. The method of claim 20, wherein the metal oxide is about 3% to about 15%, by weight, of the filter media mixture.

22. The method of claim 21, wherein the metal oxide is about 5% to about 10%, by weight, of the filter media mixture.

23. The method of claim 22, wherein the binder is about 10 %, by weight, of the filter media mixture.

24. The method of claim 2, wherein the binder is a fiber with an aspect ratio of between about 500:1 and about 700:1.

25. A method for reducing a concentration of an odorous compound in a gaseous stream comprising:

forming an activated carbon/metal oxide filter element, wherein the filter element is constructed and arranged to exhibit a structural failure when saturated with the odorous compound;

contacting the gaseous stream with the filter element such that the odorous compound is sorbed on the filter element to purify the gaseous stream; and

removing the purified gaseous stream from the filter element.

26. The method of claim 25, wherein forming the activated carbon/metal oxide filter element comprises blending an activated carbon, a metal oxide, a binder.

27. The method of claim 26, wherein forming the activated carbon/metal oxide filter element further comprises shaping the filter media mixture into a filter body.

28. The method of claim 27, wherein forming the activated carbon/metal oxide filter element further comprises calcining the filter body.

29. The method of claim 26, wherein the metal oxide is magnesium oxide.

30. The method of claim 29, wherein the metal oxide is calcined.

31. The method of claim 26, wherein blending an activated carbon, a metal oxide, and a binder comprises mixing a solvent with a binder to form a slurry prior to blending the activated carbon and metal oxide.

32. The method of claim 31, wherein activated carbon and metal oxide are dry blended.

33. The method of claim 31, wherein the binder is magnesium alumino silicate.

34. The method of claim 33, wherein the binder has a fiber with an aspect ratio of about 500:1 to about 700:1.

35. The method of claim 31, wherein the activated carbon is a powdered activated carbon.

36. The method of claim 32, wherein the activated carbon is a reactivated activated carbon.

37. A method for reducing a concentration of hydrogen sulfide present in a gaseous discharge comprising:

contacting the gaseous discharge with an activated carbon-metal oxide filter element, wherein the filter element is constructed and arranged to exhibit a structural failure when saturated with sulfur, thereby producing a product stream having a reduced hydrogen sulfide concentration; and

removing the product stream from the activated carbon/metal oxide filter element.

38. The method of claim 37, wherein the metal oxide is magnesium oxide.

39. The method of claim 38, wherein the metal oxide is calcined.

40. The method of claim 38, wherein the filter element comprises a binder.

41. The method of claim 39, wherein the binder is magnesium aluminosilicate.

42. The method of claim 40, wherein the binder has a fibrous aspect ratio of between about 500:1 and about 700:1.

43. The method of claim 37, wherein the activated carbon is a powdered activated carbon.

44. The method of claim 37, wherein the activated carbon is a reactivated activated carbon.

45. A filter element comprising:

an activated carbon;

a metal oxide; and

a fibrous binder having an aspect ratio of between and including about 500:1 and about 700:1.

46. The filter media of claim 45, wherein the activated carbon is a reactivated activated carbon.

47. The filter media of claim 45 wherein the binder is magnesium aluminosilicate.

48. The filter media of claim 45, wherein the metal oxide is magnesium oxide.

49. The filter media of claim 45, wherein the filter media has a hydrogen sulfide breakthrough capacity of at least about 0.27 gH_2S/ccC.

50. The filter media of claim 45, wherein the filter media has a moisture content of about 5 weight percent to about 15 weight percent.

51. The filter media of claim 50, wherein the filter media has a moisture content of about 10 weight percent.

52. A method for preparing a filter element comprising:

blending an activated carbon, metal oxide, and binder to form a filter media mixture;

shaping the filter media mixture to form a filter body;

drying the filter body to form a filter element having a moisture content of about 5 weight percent to about 15 weight percent.

53. The method of claim 52, wherein the filter element has a moisture content of about 10 weight percent.

54. The method of claim 52, further comprising mixing a solvent with the binder to form a slurry prior to blending the activated carbon and metal oxide.

55. The method of claim 54, further comprising dry blending the activated carbon and metal oxide.

56. The method of claim 55, wherein the binder is magnesium aluminosilicate.